

CLAIMS

1. Adaptive modem, which comprises

- 5 - a modem part which having transmitter and receiver units both using digital signal processing and a control unit needed for the modem functional control,
- a tele- and radionetwork interface part having interfaces and signal amplification and waveform shaping units needed in transmission and receiving process,
- a computer bus interface, and

10 - analysis of line response based on trigonometric or exponential calculation loops, correction algorithm and control parameters,

characterized in that digital signal processing in the adaptive modem includes a Discrete Fourier Transform (DTF) calculation algorithm as the modem receiver/transmitter for adapting the modulation of the transmitter and receiver optimal with said algorithm in respect to the data transmission speed, bit error rate and/or bandwidth of the communication channel.

2. Adaptive modem according to claim 1 **characterized in** that the modem comprises a program, said program being used for the receiver operation mode change wherein the receiver is being able to detect different digital modulations generated by the transmitter like modulations based on different symbol lengths, different numbers of bits in symbol, several simultaneous carriers (multi carrier) or different combinations of several amplitude levels and phases in purpose specially to speed data communications using ordinary telephone lines.

3. Adaptive modem according to claim 1 or 2 where the transmitter is a radio transmitter and the receiver is a radio receiver wherein said modem includes a radio interface unit **characterized in** that the modem unit comprises a program change function calculated with DFT for allowing to use in spread spectrum mode over the bandwidth desired.

4. Method for selecting the modulation mode adaptively according to the claim 1 for each communication route of the adaptive modem **characterized in** that the transmitted waveforms (modulations and modulation methods) are selected according to such a principle that in reception there are by calculations set the wanted selectivity of

the transmitted carrier frequency, the wanted amplitude selectivity and the wanted phase selectivity for the modulated received waveforms using the Discrete Fourier Transform with the adaptively selected number of samples in the receiving and sending process of waveforms over the telecommunication network interface unit or over the radio interface unit of the adaptive modem.

5. Method according to claim 4 **characterized in** that in the method each bit, several bits, ASCII character, symbol, data, message, speech or for example picture (collection of bits) will correspond a specific waveform adaptively as a part of the modulation wherein the Discrete Fourier Transform, which allows the use of any sample number in the symbol (collection of bits) detection, thus performing the adaptive demodulation/modulation (adaptive modem) functions, which in turn with an adaptively selected sample rate produces the adaptive symbol rate or as a result the adaptive bit rate which thus can be set optimally according to the channel parameters (bandwidth, S/N, jitter, multi path fading) or other requirements (BER).

sub 02 6. Method according to claim 4 or 5 **characterized in** that a message is transmitted over the telecommunication network or over the radio channels as a combined calculated and coded sum waveform of several different waveform modulations which in the reception are detected to waveforms and decoded as a message using the code information.

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